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**(54) FIBER WEB HAVING FLEXIBILITY AND METHOD FOR PRODUCING THE SAME**

(57)Abstract:

PROBLEM TO BE SOLVED: To improve the smoothness (touch feeling) and moist feeling (wet feeling) of a fiber web.

SOLUTION: A surfactant and polyhydric alcohols in proportions of 0.01-50% based on the dry weight of a fiber web material respectively are impregnated into the fiber web having 10-65 g/m<sup>2</sup> unit weight based on the standard of 20°C temperature and 65% RH humidity.

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## CLAIMS

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[Claim(s)]

[Claim 1] The fiber web which has the flexibility which is made to contain a surfactant and polyhydric alcohol 0.01 to 50% to the dry weight of a fiber web material, respectively as a softening agent, and is characterized by the bird clapper to the fiber web material of the U.S. tsubo 10 in the temperature of 20 degrees C, and 65% RH criteria of humidity - 65 g/m<sup>2</sup>.

[Claim 2] The fiber web which has the flexibility according to claim 1 which the aforementioned surfactant becomes from an anionic surface active agent.

[Claim 3] The fiber web which has the flexibility according to claim 1 which the aforementioned anionic surface active agent becomes from the alkyl phosphate of carbon numbers 8-20.

[Claim 4] The fiber web of the claim 1-3 which the aforementioned polyhydric alcohol becomes from a glycerol given in any 1 term.

[Claim 5] The manufacture method of a fiber web of having the flexibility characterized by including a surfactant and polyhydric alcohol 0.01 to 50% to the dry weight of a fiber web material, respectively as a softening agent with an imprint method or a spray method to the U.S. tsubos 10-65g/the fiber web material of m<sup>2</sup> in the temperature of 20 degrees C, and 65% RH criteria of humidity.

[Claim 6] The manufacture method of a fiber web which is made to contain an anionic surface active agent and polyhydric alcohol 0.01 to 50% to the dry weight of a fiber web material, respectively as a softening agent, and is characterized by being the method of manufacturing the fiber web which has flexibility, and not performing stoving processing to the fiber web after the aforementioned softening agent grant to the fiber web material of the U.S. tsubo 10 in the temperature of 20 degrees C, and 65% RH criteria of humidity - 65 g/m<sup>2</sup> of having flexibility.

## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention is flexible and relates to the fiber web which has the touch and the flexibility which is excellent in the both sides of admiration gently, and its manufacture method.

[0002] As a fiber web in this invention, although a nonwoven fabric is also included, they are a cellulosic fiber web, especially tissue paper preferably.

[0003]

[Description of the Prior Art] As for home papers, such as tissue paper and toilet paper, the consumption is increasing in respect of the simple nature of a life, or the amenity. In this case, as compared with toilet paper, water resistance is needed and, as for the tissue paper which can be set, intensity is needed.

[0004] Furthermore, using a softening agent from the former for raising the flexibility of tissue paper and making it software-ize a feel is known. As this softening agent, the thing of a surfactant, a wax emulsion, a reaction type softening agent (what it reacts [ what ]

firmly with a cellulose and carries out orientation of the aliphatic hydrocarbon to the circumference of fiber regularly), and a silicone system etc. is known.

[0005] However, since this kind of softening agent is a chemosynthesis article, it cannot necessarily be said to the sensitive skin that it is suitable. Moreover, the inclination which paper powder tends to generate is caused conversely, and there is a problem of absorptivity falling just because it expects the manifestation of flexibility.

[0006] It sets to JP,5-156596,A there. The salts which have hygroscopicity (a sodium chloride, a calcium chloride, a potassium pyrophosphate, sodium metaphosphate, a polyphosphoric acid potassium, sodium polyphosphate), The polyhydric alcohol and the saccharide (the glycerol, the D sorbite, the maltitol, the reduction maltose starch syrup, reduction amyolysis object) which have hygroscopicity, the thickening agent (a sodium alginate and sodium polyacrylate --) which has water retention A methyl cellulose, propylene glycol alginate, a carboxy methyl cellulose (CMC), It is indicating infiltrating a calcium carboxymethyl cellulose, sodium carboxymethyl starch, starch phosphoric ester sodium, casein, and the medical fluid containing a casein sodium into a nonwoven fabric or paper.

[0007] In this case, each thickening agent which has the salts which can be set, and which have hygroscopicity, polyhydric alcohol and a saccharide, and water retention supposes that it is what makes the operation which gives hygroscopicity, flexibility, touch nature, etc. or makes it improve. Moreover, it is supposed that it will be based on a spray method as a means to sink in a medical fluid.

[0008]

[Problem(s) to be Solved by the Invention] However, in this example of precedence, it was not smoothness (touch) and what has enough admiration (humid feeling) gently.

[0009] Therefore, the main technical problem of this invention is to raise [ smoothness (touch) and ] admiration (humid feeling) gently.

[0010]

[Means for Solving the Problem] To the U.S. tsubos 10-65g/the fiber web material of m2 in the temperature of 20 degrees C, and 65% RH criteria of humidity, the fiber web which has the flexibility of this invention which solved the above-mentioned technical problem includes a surfactant and polyhydric alcohol 0.01 to 50% to the dry weight of a fiber web material, respectively as a softening agent, and is characterized by the bird clapper.

[0011] In this invention, it is desirable that the aforementioned surfactant consists of alkyl phosphate of carbon numbers 8-20 also in an anionic surface active agent. Moreover, it is desirable that the aforementioned polyhydric alcohol consists of a glycerol.

[0012] On the other hand, as the manufacture method of a fiber web of having this flexibility, what is characterized by including a surfactant and polyhydric alcohol 0.01 to 50% to the dry weight of a fiber web material, respectively as a softening agent is proposed with an imprint method or a spray method to the fiber web material of the U.S. tsubo 10 in the temperature of 20 degrees C, and 65% RH criteria of humidity - 65 g/m2.

[0013] Moreover, the fiber web material of the U.S. tsubo 10 in the temperature of 20 degrees C and 65% RH criteria of humidity - 65 g/m2 is received. An anionic surface active agent and polyhydric alcohol are included 0.01 to 50% to the dry weight of a fiber web material, respectively as a softening agent. It is the method of manufacturing the fiber web which has flexibility, and the manufacture method of a fiber web characterized by not performing stoving processing to the fiber web after the aforementioned softening

agent grant of having flexibility is also proposed.

[0014] Unlike a water base [ , such as wet tissue, ] type thing, like usual tissue paper, a <operation> this invention is held in a carton, is taken out the whole sheet, and use is presented with it.

[0015] And in this invention, a surfactant and polyhydric alcohol are infiltrated 0.01 to 50% to the dry weight of a fiber web material to a fiber web material, respectively as a softening agent. Although it expected that it acted in independent, respectively when it thought that a surfactant is contributed to the improvement in smoothness and polyhydric alcohol contributes to the improvement in admiration gently at the beginning and used combining these, the result of an experiment became the thing easily exceeding the anticipation. That is, by combining a surfactant and polyhydric alcohol, it comes to sense a smooth feeling strong rather than the time of using the surfactant of the amount of said independently, and came to sense admiration strong gently rather than the time of using the polyhydric alcohol of the amount of said independently. Even if it is the smoothness of the same grade, the one where admiration is strong senses stronger gently a smooth (of course, it is limited) feeling. Since it can imagine easily that the one where a smooth feeling is strong senses admiration stronger gently (this is also limited) even if it is in the humid level of the same grade, moreover, the reason which brought the above results It is thought that it is probably in admiration not being offset-like as a method of sensibility gently, and acting in multiplication with a smooth feeling.

[0016] Moreover, what is necessary is just not to only necessarily combine a surfactant and polyhydric alcohol. The content of a surfactant cannot sense it almost that a smooth feeling is less than 0.01% to the dry weight of a web material, but is rough. Conversely, even if many [ too ], it is rough and comes to give stiff sensibility further. Moreover, the content of polyhydric alcohol stops sensing it almost gently that admiration is less than 0.01% to the dry weight of a web material, and it is sticky in if many [ conversely / too ], and comes to give admiration (feeling of stickiness). And in such a case, it will act on the one [ be / worse / offset-/ the feel which a surfactant produces and the feel which polyhydric alcohol produces / it ] in multiplication. From this viewpoint, the content of a surfactant and polyhydric alcohol is made into 0.01 - 50% to the dry weight of a fiber web material, respectively. It is desirable that the total content of a surfactant and polyhydric alcohol is 0.1 - 0.8% especially more suitably 0.01 to 30%.

[0017] As a surfactant of this invention, an anionic surface active agent is desirable. When an anionic surface active agent is used, even if it performs stoving to the fiber web after softening agent grant and does not carry out, while admiration appears gently, skin irritation also has a smooth feeling and other advantages that it is few compared with a surfactant. Moreover, also in an anionic surface active agent, the anionic surface active agent of a sulfonate system or a sulfate salt system has desirable alkyl phosphate, in order that a remains sulfurous odour may come out. however, the smooth feeling by the synergism of the above-mentioned when a nonionic surface active agent, a cationic surface active agent, or an amphiphilic surface active agent is used -- and improvement in admiration can be aimed at gently

[0018] On the other hand, since a flexible effect appears stoving for a line frame to the fiber web after softening agent grant when an anionic surface active agent is used as mentioned above, on the occasion of manufacture, by skipping stoving down stream processing to the fiber web after softening agent grant, dryer dirt (in the stoving

processing in a dryer, a fiber web becomes dirty) can be prevented, and the operation stability of a manufacturing installation improves. Moreover, since it is not necessary to perform stoving after softening agent grant, at any processes from manufacture to packing, softening agent grant can be performed and process planning becomes easy. [0019]

[Embodiments of the Invention] Hereafter, it explains in full detail further about this invention. If the medicine used first is explained, as a surfactant in this invention The anionic surface active agent of a carboxylate system, the anionic surface active agent of a sulfonate system, Anionic surface active agents, such as an anionic surface active agent of a sulfate salt system, and an anionic surface active agent (especially alkyl phosphate) of an phosphate system; A sorbitan fatty acid ester, Diethylene-glycol monostearate, diethylene-glycol monooleate, Polyhydric-alcohol monochrome fatty acid ester, such as glyceryl monostearate, glyceryl monochrome olate, and propylene-glycol monostearate, N-(3- me yloxy-2-hydroxypropyl) diethanolamine, Polyoxyethylene hydrogenated castor oil, polyoxyethylene sorbitol beeswax, Polyoxyethylene sorbitan sesquistearate, polyoxyethylene monooleate, Polyoxyethylene sorbitan sesquistearate, polyoxyethylene glyceryl monochrome olate, Polyoxyethylene monostearate, polyoxyethylene monochrome laurate, Polyoxyethylene monooleate, the polyoxyethylene cetyl ether, Nonionic surface active agents, such as the polyoxyethylene lauryl ether; Quarternary ammonium salt, cationic surface active agent [, such as an amine salt or an amine, ]; -- the 2nd class containing a carboxy, sulfonate, and sulfate, the aliphatic derivative of tertiary amine, or a heterocycle type, although amphionic-surface-active-agent;, such as an aliphatic derivative of the 2nd class or tertiary amine, etc. can be used Anionic surface active agent alkyl phosphate is desirable also in an anionic surface active agent especially as above-mentioned.

[0020] As polyhydric alcohol, a glycerol, propylene glycols, or those mixture can be mentioned, and especially a glycerol is desirable.

[0021] It is easy to make it fond in addition to a surfactant and polyhydric alcohol as a solvent to use water.

[0022] Moreover, it can add to the softening agent of this invention by using a well-known medicine as a secondary additive (little component) if needed. As this example, secondary additives, such as saccharides, such as a sorbitol, glucoses, or those mixture, perfume, a colorant, antiseptics, and an antioxidant, can be added at 1% or less of a rate.

[0023] a medicine [ more than / this invention ] -- the softening agent which makes a surfactant and polyhydric alcohol a base resin at least inside is prepared, and this is infiltrated for example, to a tissue paper material It will pass, if it separates from this range, and it is 15 - 25 % of the weight of surfactants, 15 - 25 % of the weight of polyhydric alcohol, and 70 - 50 % of the weight of water, and it becomes [ the Tokiyasu quality is bad and ] easy to produce separation as the suitable blending ratio of coal. As a target tissue paper material, it considers as the U.S. tsubo 10 in the temperature of 20 degrees C, and 65% RH criteria of humidity - 65 g/m2. It is 10 - 20 g/m2 more preferably. The U.S. basis weight of chewiness is lost with a low, and problems, such as producing fracture, are produced. Conversely, it will be bad inflexible if the U.S. basis weight is too high.

[0024] Although this tissue paper material can be manufactured by the conventional method, it consists of pulp 100% preferably. In this case, if NBKP:LBKP carries out

comparatively, 50:50-100:0, especially 85:15-93:7 are desirable. Soft feel nature can be obtained, so that the rate of NBKP is high. Of course, crepe processing is performed after wet paper milling. Especially as a rate of a crepe in this case, 17 - 23% is desirable 15 to 25%.

[0025] It sinks in 0.01 to 50% to web material dry weight to this tissue paper material, respectively in a surfactant and polyhydric alcohol. The suitable amount of sinking in is 0.1 - 0.8% especially suitably 0.1 to 30% to web material dry weight in the total amount of a surfactant and polyhydric alcohol.

[0026] Although a spray application is possible as a mode of sinking in as given [ concerning the example of the 1st precedence ] in an official report Since a part for a core has many coverages of the medical fluid from each spray nozzle 2 and 2 -- and the amount of periphery decreases to the tissue paper material 1 as shown in drawing 1 Though a lap is carried out, control of the lap portion is difficult, in a lap portion, Siwa occurs and overall dispersion of a coverage cannot be avoided fundamentally.

[0027] It is desirable to adopt a flexo decalcomania method especially with the decalcomania method which takes up and applies the medical fluid 5 which gives the humid feeling which plotted the impression cylinder 3 and held the tissue paper material 1 in the bat 4 to this tissue paper material 1 at this point.

[0028] Drawing 2 is what showed the gravure decalcomania method, and after it transfers a medical fluid to anilox roll (engraved roll) 6 and attains extra jacket \*\*\*\*\* with a doctor blade 7, it can be applied to the tissue paper material 1 passing through between impression cylinders 3. However, in order to adjust a coverage in this case, in the amount of extra jackets by the doctor blade 7, it is a minute amount very much, and it is necessary to change into another anilox roll 6 which has a different stamp, and the time of a roll substitute is needed. And it is uneconomical to prepare much anilox roll 6.

[0029] For this reason, the flexo decalcomania method shown in drawing 3 is the optimal. That is, after [ which consists of a rubber covered roll or a metal roll ] extracting, taking up with a roll 8 and transferring this to anilox roll 6, it is made to shift to the version drum 9, and this is applied to the tissue paper material 1. By this flexo decalcomania method, a coverage is delicately [ easily and ] controllable by adjusting the gap of the drawing roll 8 and anilox roll 6. Moreover, control of a coverage is possible also by replacing the version drum 9 with. A change of the version drum 9 can be made quickly and easily.

[0030] On the other hand, drawing 4 is what showed other gestalten of a spray method, and after carrying out the spray of the softening agent from spray equipment 11 to the tissue paper material 1 sent out from the supply reel 10, it is constituted so that it may roll round by the take up reel 12.

[0031]

[Example] It is a book by the following example. The tissue paper was milled by the cylinder machine and the tissue of dryness was obtained by drying this with a dryer. The tissue paper (an example 1 and example 2) which carries out spraying grant of the liquid which melted various softening agents in water to this tissue, and is applied to this invention was obtained. Furthermore, the tissue paper concerning these examples 1 and 2 was used, and the various properties before stoving and after stoving were evaluated. Moreover, softening agent non-given tissue was made into the example of comparison.

[0032] The evaluation result of each example is shown in Table 1 with a softening agent

content. In addition, an examiner reaches a smooth feeling by the feel, checks admiration gently, and organic-functions evaluation among Table 1 is [ -- The ordinary three-stage estimated. ] O. -- It is very good O. -- It is good \*\*.

[0033]

[Table 1]

|                        | 実施例 1                    | 実施例 2                    | 比較例  |
|------------------------|--------------------------|--------------------------|------|
| アルキルリン酸エステルカリウム塩 (%)   | 0.4                      | —                        | —    |
| カチオン界面活性剤 (%)          | —                        | 0.5                      | —    |
| グリセリン (%)              | 0.4                      | 0.5                      | —    |
| 米坪 (g/m <sup>2</sup> ) | 15.9 (加熱前)<br>15.7 (加熱後) | 15.5 (加熱前)<br>15.3 (加熱後) | 15.2 |
| ソフトネス (CN)             | 1.45 (加熱前)<br>1.43 (加熱後) | 1.53 (加熱前)<br>1.22 (加熱後) | 1.55 |
| 滑らかさ (MMD)             | 8.7 (加熱前)<br>8.7 (加熱後)   | —                        | —    |
| 官能評価                   | ◎ (加熱前)<br>◎ (加熱後)       | ○ (加熱前)<br>◎ (加熱後)       | △    |

[0034] The examples 1 and 2 concerning this invention reached the smooth feeling compared with the example of comparison, and became very good [ admiration ] gently so that clearly from Table 1. Moreover, although sufficient flexible effect did not appear unless it heat-treated, when a cationic surface active agent was used, when alkyl phosphoric ester potassium salt (anionic surface active agent) was used, sufficient flexible effect appeared regardless of the existence of heat-treatment.

[0035]

[Effect of the Invention] according to this invention the above passage -- smoothness (touch) -- and admiration (humid feeling) can be gently raised now remarkably